PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference YY8226	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/JP2004/016021	International filing date *(day/month/year)* 28 October 2004 (28.10.2004)	Priority date *(day/month/year)* 29 October 2003 (29.10.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant FUJI PHOTO FILM CO., LTD.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 27 July 2006 (27.07.2006)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Yoshiko Kuwahara e-mail: pt07@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

	Date of mailing *(day/month/year)*
Applicant's or agent's file reference YY8226	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2004/016021	28.10.2004	29.10.2003

International Patent Classification (IPC) or both national classification and IPC

Applicant
FUJI PHOTO FILM CO., LTD.

1. This opinion contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP Facsimile No.	Authorized officer Telephone No.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/016021

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ in written format

☐ in computer readable form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/016021

Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:

   ☐ paid additional fees

   ☐ paid additional fees under protest

   ☐ not paid additional fees

2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

The inventions of claims 1-14 have as a technical feature a liquid-crystal display device comprising an optical compensation film for setting a value of retardation to increase a view field angle characteristic.

On the other hand, the inventions of claims 15-18 have as a technical feature a detection method for an optical compensation film and a device for use in such correction that are aimed at studying liquid crystal orientation disturbance of an optical compensation film having an optical anisotropic layer formed from a liquid-crystal compound.

Because those inventions have no technical relationship involving one or several corresponding or identical special technical features, they do not appear to be linked so as to form a single general inventive concept.

4. Consequently, this opinion has been established in respect of the following parts of the international application:

   ☒ all parts

   ☐ the parts relating to claims Nos. _____

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/016021

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	15-18	YES
	Claims	1-14	NO
Inventive step (IS)	Claims	15, 16	YES
	Claims	1-14, 17, 18	NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims		NO

2. Citations and explanations:

Document 1: JP 2003-232922 A (Fuji Photo Film Co., Ltd.), 22 August 2003, Full text

Document 2: JP 2003-260715 A (Fuji Photo Film Co., Ltd.), 16 September 2003, Full text

Document 3: JP 60-27824 A (KOBAYASHI, Jinzou; UESU, Yoshimitsu), 12 February 1985, claims 1, 5, Fig. 1

Document 4: JP 2000-221008 A (Kabushiki Kaisha Nippon Makushisu), 11 August 200, Par. No. 0029, Fig. 1

The inventions of claims 1-14 do not appear to possess novelty based on document 1 and document 2 cited in the ISR.

Par. Nos. 0107, 0108 of document 1 describe a liquid-crystal display device comprising a liquid-crystal cell of an OCB orientation mode, a pair of polarization plates disposed on both sides of the liquid-crystal cell, and an optical compensation film comprising two optical anisotropic layers and disposed closer to the liquid-crystal cell than the polarization plate. The optical compensation film comprises a discotic liquid crystal layer with a hybrid orientation (with respect to hybrid orientation, see Par. No. 0045) and a cellulose triacetate film.

Furthermore, Par. No. 0079 of document 1 describes that the cellulose triacetate film is produced by transverse stretching, and Par. No. 0085 describes that a discotic liquid-crystal layer is provided on an orientation film obtained by rubbing treatment in the direction at 45° to the lengthwise direction of the cellulose triacetate film. Furthermore, Par. No. 0031 describes that "the angle of phase delay axis in the surface of a transparent support body is defined by an angle formed by the delay phase axis and a reference line, where the stretching direction of the polymer film is taken as the reference line (0°). Here, when the film in a roll form is stretched in the widthwise direction, the widthwise direction is taken as a reference line, and when the film is stretched in the lengthwise direction, the lengthwise direction is taken as a reference line. The average value of the delay phase axis angle is preferably 3° or less, more preferably 2° or less, and most preferably 1° or less. The direction of the average value of the delay phase axis angle is defined as an average direction of the delay phase axis".

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/016021

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 1 does not describe the units for numerical values in formula (1) despite the fact that $(\Delta n \times d)/(Re1 \times Rth2)$ has to have dimensionality of inversed value of a length. Referring to formulas (2) ~ (4), formula (1) has to be as follows:

$0.05\ nm^{-1} < (\Delta n \times d)/(Re1 \times Rth2)) < 0.20\ nm^{-1}$

Likewise, nm^{-1} units have to be assigned to numerical values in claim 8.

"The optical compensation film" in claims 5, 6, 12, 13 has to be "the first optical anisotropy layer" in "optical compensation film". This is because the description (embodiments 5, 6 of the present application) of the embodiments of the present application corresponding to the claims covers only measurements relating to the first optical anisotropy layer.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

Par. No. 0064 describes that "a circular polarization plate can be obtained by conducting lamination so that the angle between the delay phase angle of a λ/4 plate and the absorption axis of a linear polarization film be substantially 45°. Par. No. 0107 describes that "an acrylic tacking agent is pasted on the cellulose triacetate side of the optical compensation film so that the rubbing direction of the liquid-crystal cell becomes parallel to the rubbing direction of the optical compensation film on both sides of the bend orientation liquid-crystal cell, a similar acrylic tacking agent is applied on the λ/4 plate of the circular polarization plate, and the circular polarization plate is attached so that the axis direction of the base layer of the λ/4 plate of the circular polarization plate is inversely parallel to the rubbing direction of the liquid-crystal cell" (the "axis of the base layer" is apparently a typographical error of the "axis of delay layer").

Combining those descriptions, a conclusion can be made that the angle between the maximum refractive index direction of the discotic liquid crystal and the transmittance axis of the linear polarization plate is 45°, that the maximum refractive index direction in the plane of the cellulose triacetate film and the transmittance axis of the linear polarization plate are parallel or perpendicular to each other, and that the in-plane direction for which the in-plane refractive index of the optical compensation film becomes minimum is at 45° to the lengthwise direction in the manufacture of the optical compensation film.

As for the value of $\Delta n \times d$, the values of $d = 10$ μm and $\Delta n = 0.1396$ are described in Par. No. 0093 of document 1, and $\Delta n \times d = 1396$ can be calculated. Furthermore, Par. No. 0081 of document 1 describes that Rth of the cellulose triacetate film is 220 nm.

Par. No. 0010 of document 1 describes that "an optical compensation film comprising a transparent support body and an optical anisotropic film with a fixed orientation of a discotic liquid crystal is disposed between a liquid crystal cell and a polarization plate and that the value of Re (0°), Re (40°), and Re (-40°) are within the respective ranges of 35 ± 25 nm, 105 ± 55 nm, 35 ± 25 nm" and also describes that "the Re (0°), Re (40°), and Re (-40°) represent the retardation values of the optical compensation film measured with a light with a wavelength of 633 nm from a normal direction, a direction inclined at 40° to a direction inversed with respect to the direction of a minimum value from the normal line, and a direction inclined at 40° to the direction of a minimum value from the normal line within a plane comprising a normal line and direction for which the retardation of the optical anisotropic layer assumes a minimum value. Because the definition of Re (40°), Re (-40°) is inversed with respect to that of the claims of the present application, the numerical limitations in this description are within the same range as in claim 5 of the present application. Furthermore, because Re (0°) represents the retardation identical to that of Re1, the aforementioned numerical limitation is within the same range as that of claim 3 of the present application. The invention of document 1 describes only the numerical values relating to a specific wavelength, but because the main materials of the optical compensation film and liquid-crystal material are identical in the invention of document 1 and the invention of the present application, there is a high probability of fitting the numerical values in the ranges of the claims of the present application if the measurements are conducted at three wavelengths, in the same manner as in the invention of the present application.

Conducting application by a roll-to-roll process is well known to a person skilled in the art. (For example, Par. No. 0013 of document 1 describes bonding together a linear polarization film and a phase difference plate by a roll-to-roll process.)

A reflection-type liquid-crystal cell with a hybrid orientation is described in Par. No. 0089, 0090 of document 1. Par. No. 0069 of document 1 describes that $\Delta n = 0.1396$ and $d = 4.8$ μm, and $\Delta n \times d = 670$ nm can be calculated.

International application No.
PCT/JP2004/016021

Supplemental Box

Box V

Par. No. 0039 of document 2 describes a liquid-crystal device comprising an optical compensation film comprising a linear polarization film and two layers. In the optical compensation film, the layer of a discotic liquid crystal is preferred to have a hybrid orientation (see Par. No. 0033), and a biaxially transparent support body is a cellulose ester film. Furthermore, an embodiment in which a liquid-crystal cell has a bend orientation is described in Par. No. 0066. Furthermore, according to the description of Par. No. 0031, 0065, the angle between the direction with a maximum refractive index of the discotic liquid crystal layer and a transmission axis of a linear polarization plate is 45°, the direction with a maximum refractive index in the plane of the cellulose acetate film and the transmission axis of the linear polarization plate are parallel or perpendicular to each other, and the in-plane direction in which the in-plane refractive index of the optical compensation film is at an angle of 45° to the lengthwise direction in the production of the optical compensation film. Furthermore, numerical values relating to retardation can be derived from Par. No. 0052, 0064, and 0066.

The inventions of claims 15, 16 appear to involve an inventive step based on documents cited in the ISR.

Documents 3, 4 describe that a sample is disposed between a pair of rotatable polarizers and the birefringence of the sample is measured. However, the documents neither describe nor suggest measuring the light transmittance in a state in which a pair of polarizers and an optical compensation film are arranged so as to minimize the light transmittance in order to inspect the optical compensation film, as in the present application.

The inventions of claims 17, 18 do not appear to involve an inventive step based on documents 1-4 cited in the ISR.

Document 3 describes a device for finding the birefringence of a crystal, this device comprising a light source, a polarizer, a detection element, a mechanism for rotating the polarizer, a mechanism for rotating the detection element, and a photodetector.

Document 4 describes a device for inspecting transparent substrates, comprising a monochromatic light source, a polarizer, a quartz blank serving as a transparent substrate comprising a birefringence medium, a stand for the quartz blank, an analyzer, and a CCD camera, wherein the polarizer, stand, and analyzer are provided so that they can rotate.

Therefore, creating the inventions of claims 17, 18 by using the optical compensation film described in documents 1, 2 as a sample for the devices described in documents 3, 4, could be easily conceived by a person skilled in the art.